



Overview of the Identification of Hazardous Waste Under RCRA

BACKGROUND:	Subtitle C of the Resource Conservation and Recovery Act (RCRA) imposes extensive requirements on wastes that are considered hazardous under its provisions. The first step in complying with RCRA's Subtitle C provisions is understanding which wastes are hazardous, which may lead to performing waste determinations for additional purposes (e.g., complying with <i>organic air emission standards</i>). Making the determination of whether a given waste is a hazardous waste is, however, complex. This Information Brief highlights some of the important elements in determining whether specific wastes are hazardous. State rules, however, may be more stringent, and interpretations may differ from those indicated here.
STATUTE:	The Resource Conservation and Recovery Act, Sect. 3001.
REGULATION:	40 CFR 261.
REFERENCES:	<ol style="list-style-type: none">1. "Requirements for the Recycling of Hazardous Waste," EH-231 RCRA Information Brief, EH-231-001/0990, September 1990.2. "The Mixture Rule Under the Resource Conservation and Recovery Act," EH-231 RCRA Information Brief, EH-231-005/0991, September 1991.3. "RCRA Regulatory Status of Contaminated Groundwater," EPA Memorandum, November 13, 1986.4. "Hazardous and Radioactive Mixed Waste Program," DOE 5400.3, February 22, 1989.

What is a solid waste?

Because "hazardous" wastes are a subset of "solid" wastes under RCRA, one must first understand what a solid waste is. The determination of whether a waste is a solid waste is complex and requires careful analysis. However, in general, 40 CFR 261.2 defines a solid waste as any material that has been discarded by being (1) abandoned (2) recycled (in certain instances), or (3) considered inherently waste-like (e.g., certain dioxin-containing wastes). The term "abandoned" includes materials that are disposed of, burned or incinerated, or accumulated or treated prior to conducting such activities.

What is NOT a solid waste?

It is also important to understand what is not a solid waste because, regardless of the associated hazard, if a material is not a solid waste, it is not a RCRA hazardous waste. The following are examples of materials that are not solid wastes under 40 CFR 261.4(a):

- ☐ industrial wastewater discharges from point sources [Clean Water Act (CWA) Sect. 402];
- ☐ secondary materials that are reclaimed and returned to the original process in a closed loop and meet other requirements described in 40 CFR 261.4(a)(8); and
- ☐ source, special nuclear, or by-product material as defined by the Atomic Energy Act (42 USC 2011 *et seq.*).

Note: Radioactive mixed waste contains a radioactive component that is not regulated under RCRA due to this last exclusion and a hazardous component that is regulated under RCRA.

Which solid wastes are hazardous wastes?

Wastes are designated as hazardous because they have potentially harmful characteristics or they are toxic. Toxicity is determined based on the lethal, carcinogenic, teratogenic, or mutagenic potential of specific chemicals.

The various ways in which chemicals can harm people or the environment have given rise to two means of designating wastes as hazardous: (1) characteristics and (2) listings. Characteristics, such as ignitability and corrosivity, are associated with a wide variety of chemicals and are determined based on chemical properties, such as flash point and pH. One type of characteristic, the toxicity characteristic, is based on an assessment of whether a waste will leach certain constituents under specified conditions. Listings, on the other hand, focus on wastes produced from specified sources or uses. In some cases, the listings are also based on the presence of specific constituents in the waste.

What is a "characteristic" hazardous waste?

Under 40 CFR 261.20-24, wastes can be designated as characteristic ("D" code) hazardous waste based on any of the following properties:

☐ **Ignitable** wastes meet any of the following criteria:

- a liquid having a flash point less than 140°F (60°C) or
- a nonliquid that is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture, or spontaneous chemical changes and, when ignited, burns vigorously enough to create a hazard (40 CFR 173.300 and 173.151).

☐ **Corrosive** wastes are liquids that:

- have a pH ≤ 2 or pH ≥ 12.5 or
- that corrode steel (SAE 1020) at a rate 6.35 mm/yr (0.250 inch/yr) at 130°F (55°C).

☐ **Reactive** wastes have any of the following properties:

- normally unstable and readily undergo violent changes without detonating;
- react violently with water;
- form potentially explosive mixtures with water;

- when mixed with water, generate toxic gases, vapors, or fumes in sufficient quantity to present a danger to human health or the environment; or
- cyanide- or sulfide-bearing waste that can generate toxic gases, vapors, or fumes in sufficient quantity to pose a threat to human health and environment when exposed to pH conditions between 2 and 12.5. (Although the rule does not designate toxic quantities, commonly used reference thresholds are 250 mg hydrogen cyanide or 500 mg hydrogen sulfide gas per kg of solid waste.)

❑ **Toxicity Characteristic (TC)** wastes are those that leach constituents listed in 40 CFR 261.24 at or above specified concentrations. The list of regulated constituents includes metals and organics. The test used to make this determination is the toxicity characteristic leaching procedure (TCLP). Wastes that fail the TCLP are deemed hazardous wastes regardless of what process generated the waste.

What is a “listed” hazardous waste?

Under 40 CFR 261.31-33, EPA has established three basic listings of hazardous wastes: (1) wastes from non-specific sources (F wastes), (2) wastes from specific sources (K wastes), and (3) discarded commercial chemicals (P and U wastes).

The F listings are referred to as wastes from non-specific sources because F wastes can be produced by a variety of industries. For example, the F listings include wastes from electroplating and metal heat treating operations and spent solvents, which are commonly generated by a variety of DOE activities. However, to determine if the F listings apply to a waste, specific information is needed regarding the particular process that generated it and, in some cases, the constituents present in the waste. For example, the F001-F005 spent solvent listings apply only to chemicals that (1) contain specific constituents; (2) are used for their solvent properties (e.g., degreaser, extractant); and (3) are considered “spent” (no longer fit for use without first being reprocessed). It is important to note that for any of the listed wastes, one cannot determine whether a waste meets the listing definition based only on the presence of regulated constituents; information is also needed about how the waste was generated.

The K listings consist of wastes from specific industries (e.g., those associated with wood preserving and primary and secondary lead smelting). These wastes are much less likely to be encountered at DOE facilities.

The P and U listings include numerous chemicals designated as hazardous waste if they are discarded **unused**. These chemicals are regulated as **listed** wastes either because they are toxic or, in a few cases, because they exhibit a characteristic (such as ignitability). The P-listed chemicals are considered more toxic than U-listed chemicals and, thus, are identified as “acute hazardous waste.” The listings apply to the commercial chemical product or manufacturing chemical intermediate, provided the chemical listed is the only active ingredient in the formulation. Other inert ingredients can constitute most of the formulation. Off-specification unused chemicals, residues from spilling these chemicals, and residues in containers that held these products are also included in the P and U listings when discarded.

What is the status of a hazardous waste mixed with a solid waste?

The regulatory status of such mixtures depends on whether the mixture involves a listed or characteristic waste [40 CFR 261.3(a) and (b)]. If the waste is a mixture of a listed hazardous waste (in any amount) and a solid waste, the mixture is a hazardous waste bearing the waste code associated with the listed portion of the mixture. If the waste is hazardous by characteristic (or is a listed waste for which the only basis for listing is a characteristic) and the mixture no longer exhibits that characteristic, the mixture is not hazardous. The mixture rule also includes certain exclusions for the discharge of waste waters through points regulated under the CWA.²

Does the mixture rule apply to hazardous waste mixed with something other than a solid waste?

No. The mixture rule only applies to mixtures of hazardous waste and solid waste. If the material mixed with the hazardous waste is not a solid waste, then it can be treated to remove the hazardous waste and the cleaned material is not subject to RCRA regulation. This interpretive policy is known as the “contained in” concept.³ Its most common application is in environmental remediation. EPA views environmental media, such as soil and groundwater, as non-waste materials that “contain” the hazardous waste. Once the hazardous waste has been removed, they are just soil and groundwater that may be returned to the environment rather than managed as hazardous waste.

In some cases, EPA or states have applied the contained in concept to other situations. However, the concept is not applied in the same way in every state and EPA Region. Therefore, care should be taken in using this interpretation as a basis for determining that such treated mixtures are no longer subject to RCRA Subtitle C regulation.

What is the status of treatment residues?

Residues from the management of characteristic hazardous wastes are hazardous only if they still exhibit a hazardous characteristic. However, under the “derived from” rule, residues from the management of listed hazardous wastes are hazardous waste, unless they are specifically excluded. There is a subtle difference between the “derived from” concept and the mixture rule. Treatment residues from wastes listed solely because they exhibit a characteristic are still hazardous, even if they do not exhibit the hazardous characteristic [40 CFR 261.3(c) and (d)].

What is **NOT** a hazardous waste?

Section 261.4(b) also excludes certain solid wastes from the definition of hazardous waste, including (1) fly ash, bottom ash, slag, and flue gas emission control wastes from combustion of coal or fossil fuels and (2) drilling fluids, produced waters, and other wastes associated with development and production of crude oil, natural gas, or geothermal energy.

Questions of policy or questions requiring policy decisions will not be dealt with in EH-413 Information Briefs unless that policy has already been established through appropriate documentation. Please refer any questions concerning the subject material covered in this Information Brief to the RCRA/CERCLA Division, EH-413, at (202) 586-6374.